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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,099	09/08/2006	John Beavis Lasich	T2211-11119US01	4829

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EXAMINER	
MARTIN, MATTHEW T	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/25/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/567,099	LASICH, JOHN BEAVIS	
	Examiner	Art Unit	
	MATTHEW T. MARTIN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/8/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-23 are pending and are examined below.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3, 11, 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding Claims 3, 11, 19 and 20, Claims 3, 11, 19 and 20 include the limitation "the substrate". However "the substrate" does not previously occur in the Claims. Therefore, Claim 3 lacks antecedent basis. Correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1, 2, 4-8, 13-17, 22 and 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Peltzer, U.S. Patent No. 4,836,861 in view of Anderson, U.S. Patent No. 4,047,518.

Regarding Claim 1, Peltzer teaches a photovoltaic module comprising:

At least one photovoltaic cell having an exposed surface for solar radiation (see fig. 5a);

A bus bar, which provides electrical connection with an output circuit (see column 12, lines 40-55);

An assembly for extracting heat including a housing in thermal contact with the photovoltaic array including side walls and a base (see fig. 5a and column 7, lines 30-40). Additionally, Peltzer et al. teaches that a forced liquid cooling system, disposed adjacent to the photovoltaic cell, makes the cell arrangement more cost

effective (see column 8, lines 25-35). Peltzer is silent on the design of its forced liquid cooling system.

Anderson teaches a solar heating cell using fluid energy transfer. In the Anderson design, a housing including an inlet and outlet is provided for the gathering heat in a thermal transfer mechanism such as water, entering through the inlet and exiting through the outlet. The housing of Anderson includes a coolant member, which, when used as an active cooling system such as the one taught by Peltzer, would be in thermal contact with the photovoltaic cells.

Additionally, Anderson teaches that the coolant chamber includes a plurality of baffles, which can be considered a plurality of elements of high thermally conductive material (see column 4, lines 25-35) and further teaches dispersing carbon black particles within the liquid to further increase heat transfer properties (see column 5, lines 30-50). Furthermore, these additions taught by Anderson can be considered a three dimensional labyrinth for the conduction of heat, as the space within the liquid pipe exists in three dimensions and the elements are all thermally conductive.

The examiner notes that heat transfer is a vector quantity, and thus can exist in multiple pathways without physical space. In the Anderson design, the areas throughout the baffles can be considered as separate heat transfer passageways because areas with more material will transfer heat at different rates. Additionally, the carbon black particles will also provide "a substantial number" of heat transfer passageways.

The examiner further notes that it appears that applicant's coolant member is preferably a sintered body comprised of many metal or ceramic particles of high thermal conductivity. However, this is much narrower than the claimed embodiment with merely heat transfer elements, which can be almost any material arrangement.

Regarding Claim 2, Peltzer teaches disposing a heat sink or active cooling element wholly behind the photovoltaic cells (see column 8, lines 25-35).

Regarding Claim 3, the preceding claims and claim 3 do not require that any surface area of the heat transfer elements are in contact with the substrate. Therefore, it is interpreted that the area of connection does not comprise the heat transfer elements, and therefore, the heat transfer element surface area in modified Peltzer is five times greater than the surface area contacting the substrate.

Regarding Claim 4, it is the examiner's position that, absent further limitation by absent, that Anderson, which teaches that baffles and carbon black particles exist throughout the coolant pipe, reads on the limitation "substantially occupies the coolant chamber." (see column 4, lines 25-55).

Regarding Claim 5, Anderson teaches the inlet and outlet at different side walls opposed to one another (see fig. 3).

Regarding Claim 6, the examiner interprets the term "Manifold" to any area comprising more material. Therefore, the limitation of Claim 5 is met be the baffled heat pipe design taught by Anderson.

Regarding Claims 7 and 8, applicant does not provide a specific definition of a "weir" in the present specification. Therefore, Examiner interprets "weir" according to

common uses. A weir is defined in the dictionary as a “lowhead dam”, typically existing as a crest in the path of a fluid flow. Therefore, the baffles taught by Anderson, which exist at both the input and output end of the coolant pipe, are interpreted to read on the limitations of Claims 7 and 8 because they comprise a crest which partially restricts water flow (see figs and column 4, lines 25-35).

Regarding Claims 13 and 14, Peltzer teaches that the cells include an insulating substrate (see column 12, lines 40-55).

Regarding Claim 15, Peltzer teaches including a heat spreader below the substrate, which can be interpreted as integral with the substrate (see column 12, lines 45-55).

Regarding Claim 16, Peltzer teaches a plurality of photovoltaic cells, including a metallized layer (electrode) between each cell and the substrate (see column 8, lines 15-25).

Regarding Claim 17, modified Peltzer teaches a heat spreader between the substrate and the coolant member (see column 12, lines 45-55).

Regarding Claim 22, Peltzer teaches a photovoltaic module, which generates power through electromagnetic radiation, comprising:

A plurality of photovoltaic cells having an exposed surface for solar radiation;

An electrical connection with an output circuit;

A concentrator system, which, under 35 U.S.C. 112, sixth paragraph, is considered to be equivalent to "means for concentrating radiation"; where each

An assembly for extracting heat including a housing in thermal contact with the photovoltaic array including side walls and a base. Additionally, Peltzer et al. teaches that a forced liquid cooling system, disposed adjacent to the photovoltaic cell, makes the cell arrangement more cost effective. Peltzer is silent on the design of its forced liquid cooling system.

Anderson teaches a solar heating cell using fluid energy transfer. In the Anderson design, a housing including an inlet and outlet is provided for the gathering heat in a thermal transfer mechanism such as water, entering through the inlet and exiting through the outlet. The housing of Anderson includes a coolant member, which, when used as an active cooling system such as the one taught by Peltzer, would be in thermal contact with the photovoltaic cells.

Additionally, Anderson teaches that the coolant chamber includes a plurality of baffles, which can be considered a plurality of elements of high thermally conductive material (see column 4, lines 25-35) and further teaches dispersing carbon black particles within the liquid to further increase heat transfer properties (see column 5, lines 30-50). Furthermore, these additions taught by Anderson can be considered a three dimensional labyrinth for the conduction of heat, as the space within the liquid pipe exists in three dimensions and the elements are all thermally conductive.

The examiner notes that it appears that applicant's coolant member is preferable a sintered body comprised of many metal or ceramic particles of high thermal conductivity. However, this is much narrower than the claimed embodiment with merely heat transfer elements, which can be almost any material arrangement.

Regarding Claim 23, Anderson teaches that mammut beads can be used as a heat transfer element (see column 5, lines 45-65).

8. Claims 9, 10 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peltzer et al. in view of Anderson as applied to Claims 1-8, 13-17, 22 and 23 above, and further in view of Wirtz, U.S. Publication No. 2002/0108743.

Regarding Claims 9 and 10, Peltzer in view of Anderson teaches a photovoltaic energy generating device as discussed above.

Wirtz teaches providing a fluid heat exchange element comprising a porous matrix with a process of sintering small particles in order to increase the surface area of a heat transfer element. Wirtz provides a sample particle size of 1 mm (see paragraph 50).

Therefore, it would be obvious to one of ordinary skill in the art to modify the heat transfer elements used in modified Peltzer by using the sintered element with 1 mm aluminum particles taught by Wirtz because the Wirtz heat transfer device provides strong heat transfer properties at a low cost (see paragraph 50).

Regarding Claim 18, Peltzer in view of Anderson teaches a method of manufacturing a photovoltaic power generation system comprising the components discussed with respect to Claim 1.

Furthermore, the references both teach forming a coolant member, locating the coolant member in the housing, and mounting the photovoltaic cells to the housing.

Modified Peltzer does not teach sintering the coolant member.

Wirtz teaches providing a fluid heat exchange element comprising a porous matrix with a process of sintering small particles in order to increase the surface area of a heat transfer element. Wirtz provides a sample particle size of 1 mm (see paragraph 50).

Therefore, it would be obvious to one of ordinary skill in the art to modify the method taught by Peltzer in view of Anderson by sintering the coolant member as taught by because a sintered heat transfer pipe maximizes the surface area to which the coolant is exposed, facilitating greater heat transfer and thus energy generation (see paragraph 50).

Regarding Claim 19, Peltzer teaches that a solder is used to mount the photovoltaic cells (see column 4, lines 10-20).

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peltzer et al. in view of Anderson and Wirtz as applied to Claims 9, 10, 18 and 19 above, and further in view of Elbel, U.S. Patent No. 4,784,671.

Regarding Claim 20, modified Peltzer teaches a method of manufacturing a photovoltaic energy generation system as discussed above. Modified Peltzer does not teach a step of grinding the sintered body coolant member.

Elbel teaches that heat sensitive, porous materials must be ground in order to avoid structural changes when exposed to heat (see column 1, lines 15-45).

Therefore, it would be obvious to one of ordinary skill in the art to modify the method of manufacturing taught in modified Peltzer by including the grinding step taught

by Elbel because the grinding step maintains structural integrity of the porous body when exposed to heat (see column 1, lines 15-45).

10. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peltzer in view of Anderson and Wirtz, and further in view of Nithiarasu, "Finite Element Modeling of Flow, Heat, and Mass Transfer in Fluid Saturated Porous Media", Computational Methods in Engineering, 2002.

Regarding Claims 11 and 12, modified Peltzer teaches a photovoltaic energy generation system as discussed above.

Modified Peltzer is not specific about the packing density and volume properties of the porous media. Furthermore, Wirtz teaches that properties such as density and porosity are determined in manufacturing (see paragraph 50).

However, Nithiarasu teaches that packing density and volume are results effective variables for heat transfer in a porous medium, and that both packing density and % porosity, which corresponds to the claimed volume percentage, directly determine heat transfer properties (see pages 2 and 3).

The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. (see MPEP § 2144.05).

Therefore, it would be obvious to one of ordinary skill in the art to modify the heat transfer element taught by Wirtz by optimizing packing density and volume in the range claimed by applicant because these optimizations determine heat transfer properties of the resulting device. Furthermore, the examiner notes that Wirtz teaches creating its

porous medium through sintering, just like applicant, and Wirtz uses the same particle size (see pages 2 and 3. Applicant is specifically directed to the transport equations).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 1-23 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-39 of U.S. Patent No. 7,076,965 in view of Wirtz or, alternatively, Anderson.

Regarding Claims 1-23, the '965 patent claims every element of the present application in the claims, except the recitation of heat transfer elements. The '965 patent also includes the general method steps.

However, it is well known to include heat transfer elements in a photovoltaic device as discussed with respect to the Anderson reference above. Additionally, it is

well known to use a sintered body as a fluid heat transfer mechanism because of the increased surface area provided by the porous medium.

Therefore, it would be obvious to one of ordinary skill in the art to modify the '965 patent claims by using the heat transfer media taught by Wirtz or alternatively Anderson in order to provide a greater heat transfer surface area.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW T. MARTIN whose telephone number is (571)270-7871. The examiner can normally be reached on 8:30 to 5:00 EST Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Michener can be reached on (571)272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MATTHEW T MARTIN/
Examiner, Art Unit 1795
19 November 2009

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795